

REMARKS

Examiner T. Henn is thanked for the thorough examination and search of the subject Patent Application. Claims 1, 26, 35, and 39 have been amended. Claims 2, 5, 11, 24, 25, 27, 34, 37, and 38 have been canceled.

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The making FINAL of the Restriction requirement is noted. Non-elected Claims 2, 5, 11, 24, 25, 27, 34, 37, and 38 are hereby canceled. A divisional application will be filed to Claims 2, 5, 11, 24, 25, 27, 34, 37, and 38 once the elected Claims are allowed.

All Claims are believed to be in condition for Allowance, and that is so requested.

Reconsideration of Claims 1, 3, 4, 6, 12, 15, 20, 26, 28, 29, 31, 33, 35, 36, 39, and 40 rejected under 35 U.S.C. 102(b) as being anticipated by Hashimoto (US 4,768,085) in view of

Roberts (US 5,541,654) is requested based on Amended Claims 1, 26, 35, and 39, and on the following remarks.

Applicant agrees that Hashimoto teaches an imaging sensing system. However, Applicant does not believe that Hashimoto or Roberts teach or suggest a key feature of Applicant's claimed invention. Namely, Applicant teaches the simultaneous reading of a 2x2 pixel block as recited in the following:

"Fig. 11 illustrates one embodiment of a column readout control 146 (Figure 4) that supports on-the-fly color interpolation in a full resolution mode as illustrated in Figure 5. The readout control of the system 146 advantageously allows the simultaneous readout of a 2x2 pixel block. The readout control comprises a column readout control 146 that provides simultaneous readout of two columns and a row readout control 180 that provides a simultaneous readout of two rows." (Specification, page 18-19)

Applicant believes that this feature of the present invention is clearly taught in the original application. Therefore, Applicant has amended Claims 1, 26, 25, and 39 to include this a limitation wherein a 2x2 pixel block is read from two adjacent

columns and two adjacent rows. Applicant respectfully requests that this limitation be entered and believes that, thus amended, the claims should be in condition for allowance. . Claim 1 has been amended as follows:

1. (Currently Amended) A color imaging system for compensating a color response, the system comprising:
 - an array of pixel sensor elements;
 - a color filter including a plurality of color filter components organized in a predefined pattern, the color filter overlaying at least a portion of the array, wherein said pixel sensor elements include at least one element associated with a first color filter component, at least one element associated with a second color filter component, and at least one element associated with a third color filter component;
 - a first analog compensation unit coupled to at least one element associated with the first color filter component, said first analog compensation unit adapted to modify a readout of the at least one element associated with the first color filter component;
 - a second analog compensation unit coupled to the at least one element associated with the second color filter component, and second analog compensation unit

20 adapted to modify a readout of the at least one element associated with the second color filter component; an analog summing amplifier coupled to two elements associated with the third color filter component and outputting an analog sum of said two elements;

25 a third analog compensation unit coupled to said analog sum, said third analog compensation unit adapted to modify a readout of said analog sum; and

an array controller adapted to control the readout of the elements associated with the first, second and third

30 color components wherein said array controller directs said readout of said first, second, and third color filter components in a selected window of said array while other sections of said array are not processed and wherein said array controller simultaneously reads a 2x2 pixel block

35 from two adjacent columns and two adjacent rows of said array. wherein said array controller uses a programmable digital pattern generator to determine said selected window.

Claim 35 has been similarly amended. The method of Claim 26 has been amended as follows:

26. (Currently Amended) A method of compensating a color

response in an analog domain of an array of pixel sensor elements, the method comprising:

amplifying an analog output from a plurality of
5 elements of a first color component;

amplifying an analog output from a plurality of elements of a second color component wherein two said element outputs are summed together prior to said amplifying; and

10 generating a compensated analog readout of the plurality of elements of the first color component wherein only a selected window of said array is processed while other sections of said array are not processed and wherein a 2x2 pixel block from two adjacent columns and two
15 adjacent rows of said array is simultaneously read. wherein ~~the selected window is determined by a programmable digital pattern generator.~~

Claim 39 has been similarly amended.

By comparison, Hashimoto in view of Roberts does not appear to teach this feature. In particular, Hashimoto teaches:

"In this embodiment, a color signal is read out of the nondestructively readable image sensor (hereinafter

called SIT) by means of simultaneous reading of two horizontal lines. $n_{\text{sub}}.1$ H, $n_{\text{sub}}.2$ H, $n_{\text{sub}}.3$ H, represent combinations of horizontal lines $l_{\text{sub}}.1$, $l_{\text{sub}}.2$, $l_{\text{sub}}.3$, . . . simultaneously read in forming odd fields, while $m_{\text{sub}}.1$ H, $m_{\text{sub}}.2$ H, $m_{\text{sub}}.3$ H, represent combinations of horizontal lines $l_{\text{sub}}.1$, $l_{\text{sub}}.2$, $l_{\text{sub}}.3$, . . . simultaneously read in forming even fields. In particular, adjacent horizontal lines are sequentially and simultaneously read, e.g., horizontal lines $l_{\text{sub}}.1$ and $l_{\text{sub}}.2$ for $n_{\text{sub}}.1$ H, horizontal lines $l_{\text{sub}}.3$ and $l_{\text{sub}}.4$ for $n_{\text{sub}}.2$ H and so on in the odd fields." (column 3, lines 52-63, with reference to Fig. 1)

And later, with reference to Fig. 2, Hashimoto teaches:

"In dynamic or animated image sensing, a reset is effected immediately after a signal is read, and the storage time is determined based on the read timing of the next signal. In this case, since simultaneous reading of two horizontal lines is employed, line combinations are different in the odd and even fields." (column 4, lines 31-36)

Likewise, Hashimoto teaches simultaneous reading of more than one row in the claims. However, Hashimoto does not teach simultaneous reading from pixels in two rows AND two columns at the same time as is taught in Applicant's claimed invention. Applicant can find no reference in Hashimoto to reading from more than a single pixel column simultaneously. That is, it appears to the Applicant that Hashimoto teaches simultaneous reading of two pixels from two rows but the same column. However, Hashimoto does not expand this teaching to the simultaneous reading of four pixels (2x2) from two rows and two columns. This is not to be confused with windowing where an area of the array is read while another area is left unread. These windows could be 2x2 in size but, importantly, would not be read simultaneously according to Hashimoto. As Applicant understands Hashimoto, such a 2x2 area would be read in two steps. The first column of two rows is first read, then the second column of two rows is read. By comparison, Applicant's claim invention is capable of reading all four pixels simultaneously in a single read.

Applicant has reviewed Roberts and has found that Roberts teaches the following:

"Because of the connection of each reset/select buffer 116 with each of the decoder and latch pairs (100,104) and (102,106), two rows of pixels on the array 12 may be accessed simultaneously for purposes of resetting one pixel in the row identified with the address, "ADDRST", and for simultaneously accessing the image information contained in one pixel in the row of pixels identified with the address, "ADDROW". Each of these pixels will be in the same column of pixels, the column of pixels selected by the, "ADDCLM" address implemented via the decoder, latch and buffer described above with reference to FIG. 3." (column 6, lines 55-64)

Applicant believes that Roberts is also teaching simultaneous reading of several rows but of only a single column of pixels. Later, Roberts describes a "snap shot" function in which any area in the array can be read as shown below:

With the "snap shot" thus taken, the signal on trace 204 is returned to the logic low level and the pixels are interrogated for their video information as described above. Because the pixels can be accessed randomly, this interrogation of the pixels may be

performed in any order and using all or any part of the array 12', as will be clear by now. However, this interrogation of the pixels provides an output signal not indicative of the charge stored on the capacitor 44' at the time of interrogation, but indicative of the charge on the capacitor at the moment the snap shot was taken, as indicated by charge stored on the virtual capacitor 206 (the inherent capacitance of FET 200). Thus, even though the pixels of the array 12' after a "snap shot" are sequentially accessed for their video information, the "snap shot" feature provides a video image as though the pixels were all accessed simultaneously, or in a massively parallel fashion including the entire array 12, or that portion of the array which is of interest. (column 12, lines 21-39)

This feature provides pixel data that corresponds to a "simultaneous" reading of the pixels but that can only be read out in a sequential, non-simultaneous way. In this respect, this form of "simultaneous" reading is not useful for the on-the-fly interpolation taught in Applicant's claimed invention.

Based on the above analysis, Applicant does not believe that Hashimoto in view of Roberts teaches or suggests a key feature of Applicant's claimed invention. In particular, Amended Claims 1, 26, 35, and 39 include a limitation wherein a 2x2 pixel block is read from two adjacent columns and two adjacent rows. This feature does not appear to be taught in the cited art such that one skilled in the art at the time of the invention could have practiced the invention without undo experimentation. Therefore, Applicant believes that Amended Claims 1, 26, 35, and 39 should not be rejected under 35 USC 103(a) as being unpatentable over Hashimoto in view of Roberts. In addition, Claims 3, 4, 6, 12, 15, 20, 28, 29, 31, 33, 36, and 40 represent patentably distinct, further limitations on Claims 1, 26, 35, and 39 and should not be rejected if the grounds for rejecting Claims 1, 26, 35, and 39 are removed.

Reconsideration of Claims 1, 3, 4, 6, 12, 15, 20, 26, 28, 29, 31, 33, 35, 36, 39, and 40 rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto (US 4,768,085) in view of Roberts (US 5,541,654) is requested based on Amended Claims 1, 26, 35, and 39, and on the above remarks.

Reconsideration of Claims 7, 8, 30 and 32 rejected under 35 USC 103(a) as being unpatentable over Hashimoto in view of

Roberts and further in view of Boisvert et al (US 5,329,312) is requested based on Amended Claims 1 and 26 and on the following remarks.

As discussed above, Applicant believes that Amended Claims 1 and 26 now include limitations not taught in the cited art of Hashimoto in view of Roberts. Further, it appears to the Applicant that Hashimoto in view of Roberts neither teaches nor suggests the limitation wherein a 2x2 pixel block is read from two adjacent columns and two adjacent rows as is taught in Applicant's claimed invention. Further yet, Applicant has reviewed Boisvert et al and believes that this cited art also does not teach or suggest this limitation. Therefore, Applicant believes that the cited art of Hashimoto in view of Roberts and further in view of Boisvert does not teach or suggest Applicant's claimed invention, as recited in Amended Claims 1 and 26, such that one of skill in the art could have practiced this invention at the time. In addition, Applicant believes that Claims 7, 8, 30, and 32 represent patentably distinct, further limitations on Claims 1 and 26 that should not be rejected under 35 USC 103(a) as unpatentable over Hashimoto in view of Roberts and further in view of Boisvert et al.

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Reconsideration of Claims 7, 8, 30 and 32 rejected under 35 USC 103(a) as being unpatentable over Hashimoto in view of Roberts and further in view of Boisvert et al (US 5,329,312) is requested based on Amended Claims 1 and 26 and on the above remarks.

Reconsideration of Claims 9 and 10 rejected under 35 USC 103(a) as being unpatentable over Hashimoto in view of Roberts in view of Boisvert et al and further in view of Zhou et al (IEEE) is requested based on Amended Claim 1 and on the following remarks.

As discussed above, Applicant believes that Amended Claim 1 now includes a limitation not taught in the cited art of Hashimoto in view of Roberts. Further, it appears to the Applicant that Hashimoto in view of Roberts neither teaches nor suggests the limitation wherein a 2x2 pixel block is read from two adjacent columns and two adjacent rows as is taught in Applicant's claimed invention. Further yet, Applicant has reviewed Boisvert et al and believes that this cited art also does not teach or suggest this limitation. Further yet, Applicant has reviewed Zhou et al and believes that this cited art also does not teach or suggest this limitation. Therefore, Applicant believes that the cited art of Hashimoto in view of

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Roberts in view of Boisvert and further in view of Zhou et al do not teach or suggest Applicant's claimed invention, as recited in Amended Claim 1, such that one of skill in the art could have practiced this invention at the time. In addition, Applicant believes that Claims 9 and 10 represent patentably distinct, further limitations on Claim 1 that should not be rejected under 35 USC 103(a) as unpatentable over Hashimoto in view of Roberts in view of Boisvert et al and further in view of Zhou et al.

Reconsideration of Claims 9 and 10 rejected under 35 USC 103(a) as being unpatentable over Hashimoto in view of Roberts in view of Boisvert et al (US 5,329,312) and further in view of Zhou et al (IEEE) is requested based on Amended Claim 1 and on the above remarks.

Reconsideration of Claim 23 rejected under 35 USC 103(a) as being unpatentable over Hashimoto in view of Roberts as applied to Claim 1 above and further in view of Sano et al (IEEE) is requested based on Amended Claim 1 and on the following remarks.

As discussed above, Applicant believes that Amended Claim 1 now includes limitations not taught in the cited art of Hashimoto in view of Roberts. Further, it appears to the Applicant that Hashimoto in view of Roberts neither teaches nor

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suggests the limitation wherein a 2x2 pixel block is read from two adjacent columns and two adjacent rows as is taught in Applicant's claimed invention. Further yet, Applicant has reviewed Sano et al and believes that this cited art also does not teach or suggest this limitation. Therefore, Applicant believes that the cited art of Hashimoto in view of Roberts and further in view of Sano et al does not teach or suggest Applicant's claimed invention, as recited in Amended Claim 1, such that one of skill in the art could have practiced this invention at the time. In addition, Applicant believes that Claim 23 represents a patentably distinct, further limitation on Claims 1 that should not be rejected under 35 USC 103(a) as unpatentable over Hashimoto in view of Roberts and further in view of Sano et al.

Reconsideration of Claim 23 rejected under 35 USC 103(a) as being unpatentable over Hashimoto in view of Roberts as applied to Claim 1 above and further in view of Sano et al (IEEE) is requested based on Amended Claim 1 and on the above remarks.

Applicants have reviewed the prior art made of record and not relied upon and have discussed their impact on the present invention above.

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Allowance of all Claims is requested.

It is requested that should the Examiner not find that the Claims are now Allowable that the Examiner call the undersigned at 989-894-4392 to overcome any problems preventing allowance.

Respectfully submitted,

A handwritten signature consisting of the letters "SBA" in a stylized, cursive font.

Stephen B. Ackerman, Reg. No. 37,761